Phillips

UNITED STATES ARMY
CHEMICAL CORPS BIOLOGICAL LABORATORIES

FORT DETRICK, MARYLAND

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7 October 1960

Dr. Joshua Lederberg
Medical Center
Stanford University
Palo Alto, California

Dear Joshua:

Inclosed, as requested, is an additional copy of the statement given to the National Academy of Sciences. This merely stated that outside air seldom contained more than one bacterium per liter, and gave no supporting data. Another publication of ours on sampling methods, which I am also inclosing, contains more information (page 17). These are the main data on which the NAS statement was based and were collected by the same group from USPHS who co-authored the sampling monograph with us. The Detroit tests extended over a full year and this is only a brief summary of those data, but the summary is typical of all the data collected. The Oatland Island, Savannah, Georgia, data were obtained by the same group in their own back yard.

You are certainly right about the little information you can find on this subject. The USPHS studies were never reported in the open literature, except in this sampling monograph. We have the information in complete raw form since we coughed up with the money to finance the tests. So many of the few general studies that have been published were done in unusual rather than usual locations, such as very high altitudes or over the Artic. As a matter of fact, it wasn't until about twenty years ago that we had adequate equipment to make such determinations in a quantitative manner. Almost all the work earlier done on this was merely based on fallout on open petri dishes, and there is almost no way to translate such counts to atmospheric concentrations. Our main reason for publishing the monograph with the PHS was because so few people still seem to know how to sample bacterial aerosols.

I did ask Frank Wagner down the hall to jot down the references to articles which he had tucked away in his desk and I am inclosing his list. It makes no aim at completeness, and some of the articles, I fear, are on techniques only and give no data. This may stir him up into working up a decent survey of the aerosol data, and if so I'll see that you get a copy. The first article on his list is quite good. I had not read it

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until your letter set me inquiring, and it contains references to other pieces of work which are not on Frank's list and which I have not seen. Interestingly enough, the Moscow data seem to agree very well with the data we bribed the PHS to collect in Detroit.

I know of no instances where bacterial counts and total aerosol solids were determined simultaneously and I would hesitate to hazard a guess as to what the ratio would be. About 10^5 bacteria per gram is not too bad a figure for dry Kansas dirt, I suppose, and this might not be too bad a figure for the aerosol ratio. However, I would expect the aerosol ratio to be higher in so-called clean country air where the main loading factor was soil or dust, than in industrial city surroundings where artificial circumstances could increase the solids in the air without contributing much to viable bacterial counts. Kansas dust, again rather than Detroit filth, should account for most of the air microflora, I would expect. If this guess is true, old dusty Mars might have more numerous flora than Earth.

Sincerely,

Charlie

CHARLES R. PHILLIPS
Chief, Physical Defense Division

P.S. Prof. Arne Tiselius was out at Detroit Arsenal day before yesterday and in some odd manner she got to talking of "Exobiology." It seems he hadn't read your article on it and I wonder if you could drop him a reprint. We got started on the subject since he brought up Oparin's work in a talk he gave us. (And if you have plenty could I have a couple too?)

(The Army Research Office is helping finance his trip from Sweden)